

## REMARKS

Claims 1-11 are pending and under rejection in the subject application. Claim 1 has been amended to better define the claimed invention. Support for the amendment is found throughout the specification, for example on page 5, line 2, page 37, lines 29-30, and in Examples 4-12 on pages 47-50. Claim 1 has been amended for clarity. No issue of new matter is raised.

### The Invention

The rejected claims are directed to a method for controlling the cure rate of a water compatible nonemulsion, nondispersing actinic radiation curable aqueous composition containing a bismaleimide derivative by adjusting the molecular weight of the bismaleimide linking group R<sub>2</sub>.

### 35 U.S.C. §§112 and 101 Rejections

#### *Written description:*

Claims 1-11 have been rejected under 35 U.S.C. §112, first paragraph, as allegedly unsupported in the disclosure by a teaching of how to control the cure rate of the claimed composition by manipulating the molecular weight of the linker R<sub>2</sub>. However, the disclosure provides more than sufficient information to enable a skilled person to adjust the molecular weight of the bismaleimide component of the composition by varying the molecular weight of the linker R<sub>2</sub>, and thus increase or decrease the cure rate.

The specification provides numerous examples of compounds useful as linkers (see page 6 lines 25 through page 12 line 28). These individual linkers represent compounds having a range of molecular weights. Selecting any particular compound to use as the linker provides a means to manipulate the molecular weight of the linker. One particular means of so doing is exemplified in Figures 1 and 2. In Figure 1, the linker is polytetramethylene glycol and the molecular weight of the bismaleimide is varied by changing the number of repeat units in the linker. The same is shown in Figure 2, where the linker is polyethylene glycol (see page 7 lines 14-29). In order to determine the cure

rate of the compounds, the specification provides a protocol for determining cure rate as detailed on page 7 lines 1-12 and demonstrated in Figures 1 and 2.

Even though the above-described disclosure is ample to teach how to practice the claimed method, the specification also teaches specifically how to make bismaleimide derivatives and provide them with linkers of different molecular weights so that the molecular weight may be manipulated. See page 12 line 29 through page 20, line 9.

Applicants direct the Examiner's attention to Figures 1 and 2, both of which demonstrate the effect of linker molecular weight on cure rate. As linker molecular weight decreases, the conversion rate goes down, indicating that curing properties are worse (see Figures 1 and 2 and page 7 lines 16-17).

In summary, the specification provides more than enough information to allow a skilled person to manipulate the cure rate of a bismaleimide composition by manipulating the molecular weights of the  $R_2$  linkers of the bismaleimides. Therefore the Examiner is respectfully requested to reconsider and withdraw this rejection.

#### *Utility*

Claims 1-11 have been rejected under 35 U.S.C. §101 as allegedly unsupported by a specific or an established utility.

However, the claimed method has a substantial and established utility. A skilled person would readily appreciate that controlling the cure rate of an energy curable composition such as a paint, ink, or adhesive composition has utility. The ability to control how quickly or slowly the composition cures is important to make the application efficient and predictable. Ink used in a sheet printing application, for example, must have a rapid cure rate so that the print on the sheets is dry before the printed sheets are stacked. In contrast, the cure rate of an adhesive composition must be slower in order to provide time for correct alignment of surfaces.

An art-recognized example of the utility of controlling cure rate is provided by U.S. Patent No. 6,410,611, where the impact of molecular weight on curing rate is recognized and utilized in maleimide compositions used to form flat, clear coatings. See column 49 lines 14-39. Maleimides with  $R_2$  linkers having molecular weights of 100 or more have superior curing properties (see lines 35-37). Maleimides with  $R_2$  linkers

having molecular weights of less than 100 or more have inferior curing properties (see lines 14-23). Thus, the claimed method demonstrates substantial and credible utility.

There has been no demonstration that such a utility is incredible, i.e. that it is not in accordance with known scientific fact or principles. Further, the specification itself demonstrates in Figures 1 and 2 that the molecular weight of the linker affects the cure rate, as discussed above in connection with the §112, first paragraph, rejection.

Based on the foregoing, the requirements of §101 as to utility have been met. The Examiner is respectfully requested to reconsider and withdraw this rejection.

*Enablement:*

Claims 1-11 have been rejected under 35 U.S.C. §112, first paragraph as allegedly not enabled since the claimed invention lacks utility. The utility of the claimed invention is demonstrated above in response to the 35 U.S.C. §101 rejection of the claims. The enablement of the claimed invention is demonstrated above with regard to the 35 U.S.C. §112 written description rejection. Since the disclosure of the claimed invention provides utility and an enabling description, the Examiner is respectfully requested to reconsider and withdraw this rejection.

Rejection under 35 U.S.C. §102(e) over Sakurai, et al.

Claims 1-11 have been rejected under §102(e) over Sakurai, et al. (U.S. Patent No. 6,410,611). It is alleged in the rejection that Sakurai teaches bismaleimide compositions such as those employed in the claimed method, and adjusting the molecular weight of the R<sub>2</sub> group to influence cure rate. However, the Sakurai compositions do not contain water as a component. In contrast, the claimed method employs a composition which does contain water.

Water is disclosed in Sakurai only as a reactant in the synthesis of a bismaleimide compound, or as a by-product of the synthesis of this compound (see column 10 lines 3, 5, and 57; column 25, lines 53 and 58; and column 27 line 29). Therefore Sakurai does not disclose water compatible non emulsion, non dispersing actinic radiation curable compositions which include water as a component. However the claimed method is

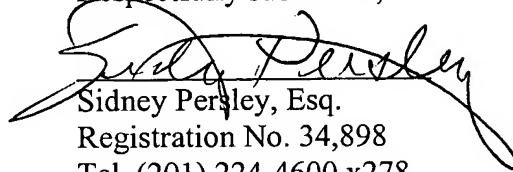
directed to such a composition, namely a composition that contains water in addition to the bismaleimide compound.

Accordingly, as Sakurai does not disclose all the features of Applicants' method, Applicants ask that the rejection be withdrawn.

#### CONCLUSION

Applicants believe that the amendments and the remarks provided herein adequately and completely address the Examiner's rejections. It is therefore respectfully submitted that the amended claims are in condition for allowance.

Respectfully submitted,

  
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